

sary. In another embodiment, a motor with a worm-drive gear moves the picker lever and the picker wheel into positive engagement with the edge of a disc. Alternatively, the movable picker assembly could be configured to serve two storage magazines, preferably with still only one picker lever.

According to yet another aspect of the present invention, a movable picker assembly travels up and down an elevator guide rod. Four rollers are mounted at equal angles around the elevator guide rod and provide the constraint for moving the movable picker assembly up and down the elevator guide rod. The elevator guide rod and the four rollers provide support for the movable picker assembly. One end of a cable is connected to an outside edge of the movable picker assembly. The other end of the cable is connected via a spring over a series of pulleys and a capstan to the center of gravity of the movable picker assembly, wherein moving the cable results in the movement of the movable picker assembly along the elevator guide rod. The offset arrangement of the cable, with or without the weight of the movable picker assembly, keeps the four rollers in contact with the elevator guide rod. Two additional rollers located on the picker arm, which follow the surfaces of a support and guide brace, complete the exact constraint of the movable picker assembly.

In an alternative embodiment, the movable picker assembly is mounted between an elevator guide rod and a worm drive screw. A portion of the movable picker assembly is equipped with guide rollers to bear against the elevator guide rod, thereby constraining the movable picker assembly as it vertically travels up and down the elevator guide rod and the worm drive shaft.

Still other objects and advantages of the present invention will become readily apparent to those skilled in the art from the following detailed description, wherein only the preferred embodiments of the invention are shown and described, simply by way of illustration of the best mode contemplated of carrying out the invention. As will be realized, the invention is capable of other and different embodiments, and its several details are capable of modification in various obvious respects, all without departing from the invention. Accordingly, the drawings and description are to be regarded as illustrative in nature, and not as restrictive.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a disc-shaped object storage and retrieval mechanism, which is an embodiment of the present invention;

FIG. 2 is a partial plan view of a disc transferred by said mechanism;

FIG. 3 is a sectional view of a preferred embodiment of the picker arm and magazine taken generally along line 3—3 of FIG. 1 viewed downwardly through the movable picker assembly;

FIG. 4 is a cross-sectional view taken generally along line 4—4 of FIG. 3;

FIG. 5 is a partial plan perspective similar to FIG. 1;

FIG. 6 is a vertical cross-sectional view taken generally along line 6—6 of FIG. 5;

FIG. 7 is a plan view of the cross-section shown in FIG. 6;

FIG. 8 is a detailed sectional view taken generally along line 8—8 of FIG. 5;

FIG. 9 is a second embodiment of the present invention showing an alternative movable picker assembly; and

FIG. 10 is a cross-sectional view taken generally along line 10—10 of FIG. 9 showing the guide rollers and threaded flanges.

DETAILED DESCRIPTION OF THE INVENTION

An embodiment of the present invention is hereafter described with reference to the drawings attached hereto.

Referring now to the drawings, FIG. 1 shows an embodiment of the present invention wherein 20 is a base or chassis, 21 is a motor which is supported by a housing 22 containing controlling mechanisms or circuitry (not shown); motor 21 drives a capstan 23, which is seated in journals 24A and 24B. A lower elevator pulley 25 is rotatably supported in base 20. Four guide rollers 26A, 26B (shown in FIG. 6), 26C, and 26D are mounted to a movable picker assembly 32 and to a roller support block 31. Guide rollers 26A—26D act to constrain movable picker assembly 32 as it moves vertically along an elevator guide rod 30. Guide rollers 26A—26D are equidistantly laterally spaced about elevator guide rod 30. Guide rollers 26A—26D and elevator guide rod 30 provide a means for supporting movable picker assembly 32. A pin 27, which is firmly seated in movable picker assembly 32, serves to fix one end of a cable 28, which is threaded over an upper elevator pulley 29, a lower elevator pulley 25, capstan 23 and fixed at an opposite end to a tension spring 11 (shown in FIG. 5). Cable 28 may be threaded through a center channel (not shown) in capstan 23 or be wound about capstan 23 via contact frictional forces produced by tension spring 11. Turning of capstan 23 moves cable 28 resulting in vertical motion of movable picker assembly 32. Cable could be oriented about capstan 23 in any manner which minimizes or prevents slippage. A disc 33 is shown in a curvilinear V-shaped groove (not shown) in an inside front surface of movable picker assembly 32. A picker wheel 34 is shown contacting a surface edge 14 of disc 33. Picker wheel 34 may have a curvilinear V-shaped groove (not shown) about its circumference which corresponds to the shape of edge 14 of disc 33. An upper elevator pulley 29 supports cable 28 above the travel of movable picker assembly 32. Several additional discs 8 are shown stored in a stacked-like configuration in curvilinear V-shaped groove storage slots 9 in a storage magazine 37. The number of discs that can be stored in storage magazine 37 is dependent upon the thickness of the stored discs. In order to maximize the storage capability of storage magazine 37, it is desirable to configure disc storage magazine 37 to store as many discs as would be physically possible, i.e., to maximize the disc packing density with respect to curvilinear V-shaped groove storage slots 9. Guide rollers 38A and 38B (38B is shown in FIG. 3) are located at the end of a picker arm 19 in contact with support and guide brace 36. A spindle means 15 is shown seated in base or chassis 20. Spindle means 15 could also be oriented above movable picker assembly 32.

The enclosing dashed line oriented about the disc storage and retrieval mechanism of FIG. 1 is representative of any machine or device which could benefit from the principles embodied in the present invention. It would be known to one skilled in the art that the present invention could be adapted to be incorporated into any such machine or device, e.g., as a removable unit or cartridge, rigidly mounted or integrated into the machine or device itself, etc.